WE CLAIM:

1. A coding means for encoding data represented by input symbols into codes for serially transmitting the codes along a communication channel, the codes being represented in the channel by signals having a limited minimum and maximum pulse width and sampled by a receiver at each receiver's clock period,

wherein the input symbols are encoded to have the minimum signal pulse width longer than one period of the receiver's sampling clock.

2. A coding means according to claim 1, wherein the input symbols are encoded to have a minimum pulse width approximately defined b' $\frac{1}{2\tau F}$ nula , where t is a minimum bit interval providing a desired bit error rate of data, and F is the bandwidth of the channel.

3. A coding means according to claim 2, wherein the input symbols are coded to have a minimum signal pulse width which is at least twice longer than one period of the receiver's sampling clock.

4. A coding means according to claims 1 - 5, wherein the minimal pulse width is equal to 2 bit intervals.

5. A coding means according to any one of claims 1 to 4, wherein a code table is created according to which each symbol is assigned one or more codes.

6. A coding means according to claim 5, wherein the code table is created taking into account constraints selected from maximum and minimum pulse width, code word width and DC balance/unbalance of the signal in the channel.

7. A coding means according to claim 5, wherein 8 bit input symbols are encoded into a 13 bit output codes in accordance with the code table provided that, in a sequence of two codes, each bit, except for the first and the last bit of the sequence, must have the same left or right neighbor bit.

8. A coding means according to claim 6, wherein 8 bit input symbols are encoded into 16 bit output codes according to the code table created to produce a DC

balanced signal and containing two parts of codes, one part for coding symbols with negative current disparity, and another part for coding symbols with positive current disparity, the table being such that:

- each input symbol corresponds to two codes, one code being from the first part of the table and the second code being from the second part;
- codes presented in both parts of the table shall be assigned to the same input symbol;
- within each code presented in the part of the table for negative current disparity, the sum of "1"s is equal to 8 or 9;
- within each code presented in the part of the table for positive current disparity, the sum of "1"s is equal to 7 or 8;
- the current disparity is negative when the previous code has 9 or 8 "1"s; and the previous state of disparity was negative, otherwise it is positive;
- in any sequence of two codes, one code consisting of 8 "1"s and taken from one part of the table, and another one being any code taken from the same part of the table, each bit of the code must have the same left or right neighbor, except for the first and the last bit of the sequence;
- in any sequence of two codes, one code consisting of the number of "1"s different from 8 and taken from one part of the table, and another code being any code taken from the other part of the table; each bit of the code must have the same left or right neighbor, except for the first and the last bit of the sequence;
- the two parts of the table contain preferably equal number of codes.

9. A coding means according to any one of claims 1 to 8 wherein the code table is reordered to provide the optimal coder implementation such as having minimal logical terms.

10. A coding means according to any one of claims 1 to 9, implemented in hardware.

11. A coding means according to any one of claims 1 to 10 selected from a hub, a switch, router, modem or processor.

12. A coding means according to any one of claims 1 to 10, implemented in logic synthesised or created from a table listing of the code alphabet.

13. A coding means according to any one of claims 1 to 10, implemented in a lookup table.

14. A coding means according to any one of claims 5 to 13 wherein the code table is split into subtables and an intermediate code computed from which the final code is determined.

15. A method of coding data represented by input symbols into codes for transmitting along a communication channel comprising a transmitter for serially transmitting codes represented in the channel by signals having a limited minimum and maximum pulse width and a receiver for sampling data at each clock period,

wherein the input symbols are encoded to have the minimum signal pulse width longer than one period of the receiver's sampling clock.

16. A method of data communication comprising the steps of coding input data, transmitting the obtained output codes and sampling the output codes at a receiver at each clock period, wherein the coding is performed so that the output codes have the minimum signal pulse width longer than one period of the receiver's sampling clock.

17. The method of data communication as claimed in claim 16, further comprising a step of decoding output codes to obtain respective output symbols.

18. A communication apparatus for transmitting and receiving digital data, comprising:

- a coder for coding data represented by input symbols into codes;
- a transmitter for serially transmitting along a communication channel the codes represented in the channel by signals having a limited minimum and maximum pulse width; and
- a receiver for sampling data signals at each clock period,

wherein the coder codes input symbols to have the minimum signal pulse width longer than one period of the receiver's sampling clock.

19. A communication apparatus as claimed in claim 18, wherein the minimal pulse width is equal to 2 bit intervals.

20. A communication apparatus as claimed in claim 18 or 19, further comprising a decoder for decoding codes received by the receiver into respective output symbols.

21. A communication apparatus according to any one of claims 18 to 20, wherein the receiver takes multiple samples during each clock period to track the dynamic variation in the temporal or amplitude thresholds of the data to improve the overall coding efficiency.

22. A communication apparatus according to claim 21, wherein the samples taken by the receiver are spread in time around a regular sampling clock that enables the dynamic shift in the received data to be tracked by matching shifts in the sampling clock or inverse shifts in delay circuitry within the receiver.